Electromagnetic Flowmeter for Water Applications

Model MCB10A

OVERVIEW

Model MCB10A is an electromagnetic flowmeter for water measurement applications based on field proven Azbil Corporation's technologies.

Model MCB10A, offers appropriate functions for water applications, thus compact in size and best meets water flow monitoring.

FEATURES

Lowest “Cost of Ownership”

Energy efficient

No pressure loss occurs with the electromagnetic flowmeter thus resulting in less energy required for the flow.

Maintenance free

Model MCB10A does not have any moving parts in a flow-tube thus resulting in free from maintenance.

Easy operation

Model MCB10A has all necessary functions for water flow monitoring thus resulting in easy operation.

Compact in size and light in weight

Easy to handle and easy to install.

APPLICATIONS

Utility in factories

Monitoring water consumption in factories.

Monitoring cooling water

Monitoring filtering water

Nominal size: 15 to 100 mm
**FUNCTIONAL SPECIFICATIONS**

### Output signal

**Analog output**
- 4 to 20 mA DC
  - Load resistance: 0 to 400 Ω.

**Pulse output**
- Select either pulse output or contact output.
  - **Pulse output (Totalized value output)**
    - Open collector
    - Contact capacitance: 30V DC max., 100 mA max.
    - Pulse width: 1 ms to 1 s
    - Adjustable between 1ms to 1s or fixed at 50% of duty.
    - Pulse frequency: 0.0001 to 500 Hz
  - **Contact output**
    - Open collector
    - Contact capacitance: 30 V DC max., 100mA max.
    - Alarm for Hi-Lo limit or failure status output

### Flow unit

- **Volume flow**: m³, L, cm³, G (gallon), mG, kG, IG (imperial gallon), mIG, kIG, B (barrel)
- **Mass flow**: t, kg, g, lb.
- **Time**: d, h, m, s

### Display

- **Display**: LCD
  - Main display: 7-segment, 8 digits
  - Sub display: 16 digits, 2 lines
  - Display contents:
    - Demonstrates three values simultaneously
    - % flow rate, Actual flow rate, Totalized value

### Data setting

- Operation by four key switches

### Damping

- Adjustable between 0.5 and 199.9 seconds.
- Default setting: 5 seconds
- Low flow cutoff
- Adjustable between OFF (0%) and 10% of setting range.
- Below selected value, output is driven to the zero flow rate signal level.
- Default setting: OFF (0%)

### Dropout

- Adjustable between 0 and 10% of setting range.
- Below selected value, pulse output is cut.
- Default setting: 2%

### Optional specifications

- **Traceability certificate**
  - The following three documents are included.
    - Traceability system chart
    - Traceability certificate
    - Test report

### PHYSICAL SPECIFICATIONS

- **Case material**: Polycarbonate
- **Case cover material**: Polycarbonate

### INSTALLATION

- **Cable gland**: Plastic gland (3 pieces)
- **Cable**
  - Applicable cable outer diameter: φ6 to φ12 mm
  - Applicable cable conductor
    - Power supply: AWG14 to 22 (0.32 to 2.03 mm²)
    - Outputs: AWG16 to 26 (0.13 to 1.31 mm²)
- **Mounting**: Integral type
- **Grounding**: Grounding resistance should be less than 100 Ω.
- **Vibration effect**: Integral style: 4.9 m/s² max. (0.5 G max.)
FUNCTIONAL SPECIFICATIONS

Temperature range of process fluid
-20 to 90 °C (no freezing)

Pressure range of process fluid
2.0 MPa max. (20 kgf/cm² max.)

Measurable process fluid
Water, hot water
(no corrosive fluid, no abrasive fluid)

Measurable electrical conductivity
50 to 50,000 µS/cm

Measurement flow range

<table>
<thead>
<tr>
<th>Size (mm)</th>
<th>Minimum range (m³/h)</th>
<th>Maximum range (m³/h)</th>
</tr>
</thead>
<tbody>
<tr>
<td>15</td>
<td>0 to 0.637</td>
<td>0 to 3.18</td>
</tr>
<tr>
<td>25</td>
<td>0 to 1.768</td>
<td>0 to 8.835</td>
</tr>
<tr>
<td>40</td>
<td>0 to 4.524</td>
<td>0 to 22.619</td>
</tr>
<tr>
<td>50</td>
<td>0 to 7.069</td>
<td>0 to 35.342</td>
</tr>
<tr>
<td>65</td>
<td>0 to 11.946</td>
<td>0 to 59.729</td>
</tr>
<tr>
<td>80</td>
<td>0 to 18.096</td>
<td>0 to 90.477</td>
</tr>
<tr>
<td>100</td>
<td>0 to 28.275</td>
<td>0 to 141.371</td>
</tr>
</tbody>
</table>

Size
15, 25, 40, 50, 65, 80, 100 mm

Flange rating
R1/2 internal thread, R1/2 external thread (15 mm)
Wafer style (15 to 100 mm)
JIS10K, JIS20K, ANSI150,
JIS G3443-2 F12 (for size 80 mm or larger)

Reference flange standard
JIS; JIS B2210 (1984)
ANSI; ANSI B16.5 (1988)

Vibration effect
Integral style: 4.9 m/s² (0.5G) max.

Ambient temperature limits
0 to 50 °C

Ambient humidity limits
5 to 85% RH (no condensation)

PERFORMANCE SPECIFICATIONS

Accuracy
± 1% of rate (flow velocity: 0.5 to 5 m/s)
± 0.05 m/s (flow velocity: 0.1 to 0.5 m/s)

Accuracy is guaranteed by the totalized flow volume under the condition of continuous flow measurement for 30 seconds or longer.

Magnetic field effect
± 0.2% F.S. (400A/m)

PHYSICAL SPECIFICATIONS

Main body materials
Case material
SUS304 stainless steel

Measuring pipe material
SUS304 stainless steel

Process wetted materials
Lining
PFA (for size 15 mm)
Polypropylene (for size 25 to 100 mm)

Electrode
SUS316L stainless steel

Grounding ring
SUS304 stainless steel

INSTALLATION

Pipe connection
Wafer style

Grounding
Grounding resistance should be less than 100 Ω.

Length of straight pipe
Upstream side
A minimum of five straight pipe diameters
A minimum of 10 straight pipe diameters is required if diffuser/valve/pump installed on the upstream side.

Downstream side
Two straight pipe diameters are recommended.
### Upstream side

<table>
<thead>
<tr>
<th>Configuration</th>
<th>Detector</th>
<th>Criteria</th>
</tr>
</thead>
<tbody>
<tr>
<td>Right-angle joint</td>
<td>Diffuser with cone angle</td>
<td>Greater than 5 dia.</td>
</tr>
<tr>
<td></td>
<td>greater than 15°</td>
<td>(if cone angle is 15° or less,</td>
</tr>
<tr>
<td></td>
<td></td>
<td>considered as straight pipe)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Detector</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Greater than 10 dia.</td>
</tr>
<tr>
<td>T joint</td>
<td>Concentrator (considered as</td>
<td>Greater than 5 dia.</td>
</tr>
<tr>
<td></td>
<td>straight-pipe section)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Detector</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Greater than 5 dia.</td>
</tr>
<tr>
<td>Gate Value (completely open)</td>
<td>Any Control Value</td>
<td>Greater than 5 dia.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Detector</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Greater than 10 dia.</td>
</tr>
<tr>
<td>Any pump</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

#### Mounting

**Integral style (installed on the piping)**

#### Optional specifications

**Bolts and nuts**

- **Carbon steel**
  
  Carbon steel bolts and nuts for installing the detector on the piping are provided.

- **SUS304 stainless steel**
  
  SUS304 stainless steel bolts and nuts for installing the detector on the piping are provided.
Notice for installation
To fully enjoy the performance of the device, please choose an appropriate location according to the following.

Notice after installation
⚠️ WARNING
When removing the device from the piping, make sure that there is no line pressure or process fluid inside of the device. Removing the device before depressurizing may result in serious injury.

⚠️ CAUTION
Do not use the device as a foothold. It may cause injury or damage of the device.

Notice for environment
- Install the flowmeter in a location with an ambient temperature of -25°C to 60°C (-13°F to 140°F) and an ambient humidity of 5 to 100%RH to prevent equipment malfunction or output errors.
- Do not install the flowmeter near high-current power lines, motors or transformers to prevent damage from electromagnetic induction, which can cause equipment malfunction or output errors.
- Do not install the flowmeter in a location subject to severe vibration or in a highly corrosive atmosphere. The converter and detector can be damaged.
- When installing DC-powered electromagnetic flow meters adjacent to each other, make sure that there is a space of 500 mm or more between the ends of the detectors.
- Install this device indoors or in a place not exposed to direct sunlight, wind, or rain. Avoid exposing it to direct sunlight, even indoors. When using this device outdoors, protect it from direct rain or sunlight by providing a cover, etc.

Notice for application
- Electrochemically homogeneous fluid
- Install the device where the process fluid is electrochemically homogeneous. If two kind of process fluids are mixed at the upstream side, the process fluid must be uniformly mixed.
- The application which the electric conductivity changes or non-homogeneous fluid
- Do not use the device for the following fluid conditions even if the electric conductivity, temperature, and pressure are within the device specifications. Those fluid may cause of inaccurate flow measurement.
  - Fluids that have sufficient conductivity at high temperature but do not meet the conductivity requirement at room temperature (about 20°C (68°F)). (e.g. fatty acids and soap)
  - Some fluids contain surfactant (e.g. rinse, shampoo and CWM (coal water mixture))
  - Insulating adhesive materials (e.g. kaolinite, kaolin, calcium stearate)
## MODEL SELECTION

### Electromagnetic flowmeter

<table>
<thead>
<tr>
<th>Basic model no.</th>
<th>Selection</th>
<th>Option</th>
</tr>
</thead>
<tbody>
<tr>
<td>MCB10A</td>
<td></td>
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</table>

<table>
<thead>
<tr>
<th>Size</th>
<th>Selection</th>
</tr>
</thead>
<tbody>
<tr>
<td>15 mm</td>
<td>015</td>
</tr>
<tr>
<td>25 mm</td>
<td>025</td>
</tr>
<tr>
<td>40 mm</td>
<td>040</td>
</tr>
<tr>
<td>50 mm</td>
<td>050</td>
</tr>
<tr>
<td>65 mm</td>
<td>065</td>
</tr>
<tr>
<td>80 mm</td>
<td>080</td>
</tr>
<tr>
<td>100 mm</td>
<td>100</td>
</tr>
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</table>

<table>
<thead>
<tr>
<th>Style code</th>
<th>Option</th>
</tr>
</thead>
<tbody>
<tr>
<td>Global model</td>
<td>GLB</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Power supply</th>
<th>Option</th>
</tr>
</thead>
<tbody>
<tr>
<td>100V AC</td>
<td>A</td>
</tr>
<tr>
<td>24V DC</td>
<td>G</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Centering jig (customer’s piping)</th>
<th>Option</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wafer JIS10K</td>
<td>11</td>
</tr>
<tr>
<td>Wafer JIS20K</td>
<td>12</td>
</tr>
<tr>
<td>Wafer ANSI150</td>
<td>21</td>
</tr>
<tr>
<td>Wafer JIS G3443-2 F12 (for 80 mm or larger size)</td>
<td>31</td>
</tr>
<tr>
<td>Union R1/2 external thread (for 15 mm size only)</td>
<td>U1</td>
</tr>
<tr>
<td>Union R1/2 internal thread (for 15 mm size only)</td>
<td>U2</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Bolts and nuts</th>
<th>Option</th>
</tr>
</thead>
<tbody>
<tr>
<td>None</td>
<td>X</td>
</tr>
<tr>
<td>Carbon steel bolts and nuts</td>
<td>1</td>
</tr>
<tr>
<td>SUS304 stainless steel bolts and nuts</td>
<td>2</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Options</th>
<th>Option</th>
</tr>
</thead>
<tbody>
<tr>
<td>None</td>
<td>X</td>
</tr>
<tr>
<td>Traceability certificate</td>
<td>B</td>
</tr>
<tr>
<td>Non SI Unit</td>
<td>H</td>
</tr>
<tr>
<td>Setting customer’s required range</td>
<td>K</td>
</tr>
</tbody>
</table>
**DIMENSIONS**

**Union style: 15 mm**

Weight: 2.3 kg

**Wafer style: 15 mm**

Weight: 2.1 kg
Wafer style: 25 to 100 mm

<table>
<thead>
<tr>
<th>Nominal size (mm)</th>
<th>25</th>
<th>40</th>
<th>50</th>
<th>65</th>
<th>80</th>
<th>100</th>
</tr>
</thead>
<tbody>
<tr>
<td>Face to face dimension (mm) L</td>
<td>56</td>
<td>77</td>
<td>83</td>
<td>93</td>
<td>103</td>
<td>117</td>
</tr>
<tr>
<td>Height (mm) H</td>
<td>229</td>
<td>245</td>
<td>263</td>
<td>280</td>
<td>293</td>
<td>318</td>
</tr>
<tr>
<td>H1</td>
<td>34</td>
<td>43.5</td>
<td>52</td>
<td>62</td>
<td>67</td>
<td>79.5</td>
</tr>
<tr>
<td>Case outer diameter (mm) φD</td>
<td>68</td>
<td>87</td>
<td>104</td>
<td>124</td>
<td>134</td>
<td>159</td>
</tr>
<tr>
<td>Weight (kg)</td>
<td>1.9</td>
<td>2.3</td>
<td>2.9</td>
<td>3.3</td>
<td>4.2</td>
<td>5.3</td>
</tr>
</tbody>
</table>

[Unit: mm]